

Published for the old time Wireless Operator, Historian and Collector

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Lee DeForest Passes And an Era Is Ended

Not so long ago we sat enraptured (if we may use such a word) listening to Lee DeForest tell the inside story of his early work on the Audion. The chat was recorded on tape, so that, come what may, the future could base some of its judgment of the man and his works upon his own spoken account of the matter. It was a little hard to consider that Dr. DeForest wouldn't always be around. He was 84 and still applying for more patents -- with his total up around 3001

On July 2, the key fell silent. We would not here attempt to review even a small part of his accomplishments. Read his "Father of Radio" and many other books by contemporaries for the DeForest story. Talk to some of the guys, if any are still around, who heard his "broadcast" of Caruso from the Met on Dec. 19, 1908 or the broadcast to Paris from Arlington in 1915. There must be a million stories floating around, including a lot that never made print.

What with billions of bucks to play with and a mighty serious purpose ahead, our modern electronic geniuses invent vacuum tubes and semiconductors and lasers and masers by the dozen before breakfast. It is tremendous to contemplate. But we still want to take our hat off to the memory of the man who began it all by spending seven years trying to get a little zig-zag piece of wire in between two electrodes in a vacuum tube to perform the way he figured it should. It sure made a difference to "wireless"!

The Antique Wireless Association treasures the two DeForest tape recordings in its archives, donated by W6ELW. Of greatest interest is the one he made on the occasion of his 85th birthday when 16,000 hams sent QSL cards with "Happy Birthday" scribbled on them. In this recording--in a voice that betrays his years but is nonetheless strong and authoritative--DeForest

The Real McCoy

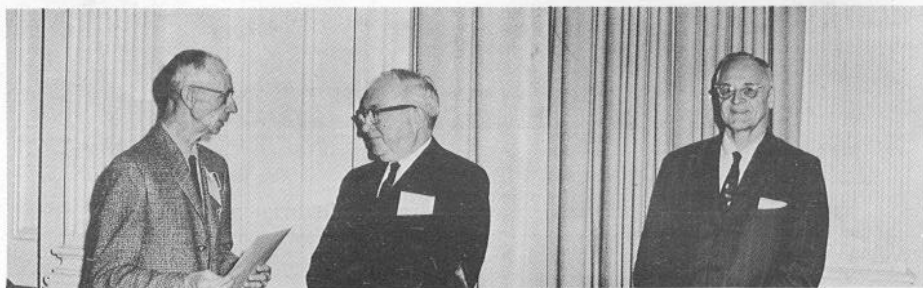


We reproduce in this issue of the BULLETIN the grand story which Dan McCoy has put together for us on amateur radio in the NYC area prior to WWI. Funny thing about the history of wireless -- it seems inseparable from the characters and personalities of the men who started it and got it through the nursery. We think you'll discover, as we did, that W3DQ has added as much color to the background of the art as the art itself has bestowed upon him!

"RADIO AND WIRELESS 1905 - 1928" is the title of a new book recently released by the Floyd Clymer Publishing Co. and compiled by Harold Greenwood, W6MEA. Although we have not had an opportunity to thoroughly examine all the contents, we do recommend it to anyone interested in radio. In fact, even the layman will find it of great interest, since it is profusely illustrated and easy to follow. At a price of only \$3 -- a must for your bookshelf. (More info in next issue.)

dwells at length on the role amateur radio played in the development of communications, revealing that at no time had he ever been able to increase his code speed over 15 wpm! His account of the development of the 3-element vacuum tube is enlightening--as is his reference to the Fleming valve and regenerative circuits--areas of controversy on which whole "books" have been written!

Trenton Old Timer's Nite



Earl Williams, W2EG

Harry Houck

Tom Appleby, W3AX

"Early Licensed Amateur" "Early Pioneer"

"Grand Old Man"

The 1961 DVRA's "OT NITE" held again in Trenton, N.J. was its usual successful get-to-gether of old time amateur and commercial wireless operators. The credit for this unusual gathering of pioneers goes again to Ed Raser, W2ZI. Ed appears a little weary at times of the tremendous task every 12 months of whipping such an event together; however, all the OT's are solidly behind him and are 100% for continuance of the affair.

Your Editor directed Frank Shannon, W3QR, Ed Duvall, X-3DW, Jay VanHorn, W3PW, Geo. Applegate, W2IA, Harry Houck, Bob Adams, W3SW and Joe Simpson at his table. Nearby tables found groups of OOTC and QCWA members, former employees of DeForest, Marconi, Fessenden, Massie, Independent, United, Tropical Radio and other pioneer wireless organizations.

"Grand Old Man" of the evening was Tom Appleby, W3AX. One could hardly challenge Tom's position since he constructed his first transmitter (1/2" Ruhmkorff coil) and receiver (coherer) in 1899! He pioneered in the wireless field at many of the early commercial wireless stations including "AX" at Atlantic City. The old timers in New Jersey and the Philadelphia area, however, remember him as the owner of the Radio Apparatus Co. and later the Appleby Radio Corp. "Tom" is Cdr. USNR Retired and now lives in Washington, D.C.

"Oldest Licensed Amateur" present was none other than Earl Williams, W2EG. Earl needs no introduction, particularly to you 40 year men since he is Secretary of the "OLD, OLD TIMER'S CLUB". Of all those present, only three were listed in the 1913 Government Call Book - W2EG, W2WX and W3PW. (It is true that a good many of the fellows were active in 1913 but either had neglected to obtain a license or were in commercial service at the time.) Earl started in the game in 1908 when as a lad he and a companion bicycled from Perth Amboy, N.J. to the Electro-Importing Co. on West Broadway, N.Y.C. for their first gear. Thru the succeeding years, W2EG has been a true amateur, a CW man and the builder of his own equipment. Earl laments the fact that so many of the present amateurs never have had to be frugal and build or improve their equipment. The complete tailor made station from the nearest radio store is the present day motto!

"Early Pioneer" and former President of the Radio Club of America was represented by none other than Harry Houck. Harry also started in the game way back in 1908. He was a very close friend of Maj. Ed Armstrong and one time assistant. His association with commercial radio is well known. Those of you who have the Radio Club of America's Jubilee recording have heard his early spark transmitter or may have seen it at the recent I.R.E. show in New York City. Harry confided that he may get his "ham" ticket again and join the "gang"!

LAS VEGAS, NEVADA is hardly the place one thinks of as the location for historical radio material; however, if there, look up Paul Thompson and you'll see one of the nicest collections of receivers in the west. Paul has everything from an IP-500 to a complete set of Radiolas plus Kennedy's, Grebe's, etc.

WAYNE GREEN, W2NSD and Editor of "73" magazine, feels the historians are missing a good bet by not giving some thought to historical material of the 1930's and even WWII. After all, we're talking about 20 to 30 years ago and time is marching on!

SILENT KEY - W6TI It is with sadness we make note of the passing of our friend Horace Greer, W6TI on June 15. (See photo and writeup in Apr. issue of Bulletin). Horace was one of better known and liked old timers on the West Coast. A great supporter of the A.R.R.L. - he was their QSL Manager for over 25 years.

RELAY AUDION - sounds rather impressive doesn't it? It is just another name for the Welsh Peanut tube (Dollar Detector) which came out in the early 20's. Fred Penard again came thru with the circuit and info on this odd one!



Q C W A PICNIC on the WEST COAST

Left to right: K6EQW, W6DVD and W6YPM. "Erw", W6YPM, incidentally is the lucky fellow who recently dug up some brand new DeForest Audions in the original cartons! Others present included Henry Dickow who started the Magazine "PACIFIC RADIO" forty years ago - remember? On the subject of W6YPM - we understand that when he was 9BCH back in 1923 he qso'ed Sen. Barry Goldwater! Grab an old call book fellows! (tnx - W6ELW)

CUTTLE, MAINE info comes from W1CX. Jim tells us that the new super high power station (the most powerful in the world) is using the call letters of NAA !! - and operates on frequencies possibly as low as 14 kilocycles (20,000 meters). Most transmissions are teletype or tape CW. It will take a real long wave job to pull in this station. W1CX has a surplus RBH-5 Navy receiver which just about makes it. (Tuned R.F./det/aud. rx.)

WIRELESS WORLD is the name of a well known British magazine which recently celebrated its 50th Anniversary. We strongly recommend that all radio historians obtained the April, 1961 issue which commemorates the occasion. A large special edition, it contains the history of wireless in chronological order from the earliest days. Even though we were tipped off about this only recently, we were able to back order at the local magazine store for several copies at \$.80 each.

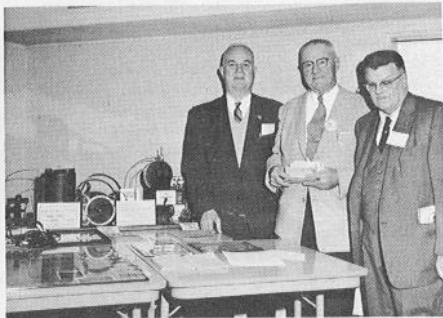
APOLOGIES TO W2IA AND POPOFF!

A misplaced asterisk drew a reprimand from W2IA, whose coherer article appeared in the last issue. The footnote stating that Popoff had no transmitter and that he demonstrated only via lightning pulses was intended to refer solely to Popoff's prediction, with respect to these demonstrations, that his device was "applicable to the transmission of signals at a distance". We thought this forecast commendable and noteworthy. Before the year (1895) was out, Popoff had proved such "communication" possible, using man-made transmitting devices. W2IA promises to present more dope on this in later issues.

OLD WIRE TELEGRAPHER is W2EAF. Gene started in the game about 1912 and has been associated with various outfits including Postal, Western Union, brokerage houses, etc, and finally as Wire Chief for the New York Central R.R. since 1925 until retirement. He would like to know if any of the group knows the whereabouts of Al Goffinet who went with United Fruit Co. back in 1918?

OLD, OLD TIMERS CLUB activities are published bi-monthly in their bulletin "Blabber Mouth". An item that caught our eye in the July issue was one sent in by Harry, W8RHZ, concerning the origin of the word "ham" as applied to the radio amateur. Must be two hundred different "origins" by now! An interesting project the OOT's are working up with Merrill, K2BX, as Chairman, is an OOTC Award based on the number of contacts with fellow members. If you have been in the game 40 or more years (and can prove it!) drop a line to Earl, W2EG, and get more dope on the OOTC.

LATEST A.W.A. HISTORICAL MATERIAL -- In the future, all the latest historical material received for the Museum archives and collections will be listed in the Bulletin. As usual, this material is available to members for research and display purposes. (Write Secretary for details.) Most recent donors or loaners are: W1SS - Historical photos, K2DQ - LW receiver, W2EG - Early equipment, etc., W2ETY - G.E. History, W2KIO - Rider manuals & gear, K2POI - Historical photos, W2RKM - Early German tubes, K2YMM - Early gear, etc., W3AX - Historical recording, X-3DX - Electronic flash lamp, W5AU - Early photograph, W7DE - Early Navy Wavemeter.



Q C W A at DAYTON HAMVENTION

Left to right: Jack Gray, W8JDV, Dan McCoy, W8DG and Ralph Barber, W2ZM.

These OT's hardly need an introduction as both Jack and Dan are local officers of the QCWA Chapter; whereas Ralph is the National Secretary of the Quarter Century Wireless Association. The boys had an excellent exhibit of early amateur gear and were responsible for a fine program presentation. (Tnx - W8JDV)

THE OLD TIMER'S BULLETIN

EXTRA! BULLETIN GETS
ANGEL! ANTIQUE WIRELESS
ASSOCIATION TO RESCUE

We promised in the last issue to tote up our one-man cost of putting out the BULLETIN and wind up with a realistic subscription rate for our growing list of readers. Actually, at \$1.00 per year for quarterly issues we darned near broke even. But increased mailing costs (we're going to go to First Class and envelopes) make it mandatory to go to \$1.50 per year.

But more important - both to ourselves and to our readers - the OLD TIMERS BULLETIN, beginning with the next issue, becomes the "official" bulletin of the Antique Wireless Association and will be included without extra cost in the A.W.A. annual \$3.00 dues. This "marriage" will please many an old timer who, in the past, has wanted to pitch in a penny or two to help the guys in A.W.A. put out its remarkably informative and sometimes dramatic slide-tape shows on the history of wireless. Many of you have seen one or more of them. So your \$3 membership in A.W.A. does two things: contributes \$1.50 to help pay for the magnetic tape film, and color slide materials used in A.W.A. shows and continues to bring you the OLD TIMERS BULLETIN - which we know we can make better and better as time goes on.

Those who have sent in their \$1 for a year's subscription to the BULLETIN will, of course, continue to receive it for their full four issues without any extra charge. But upon renewal - and we pray everybody wants to renew - you join A.W.A. at \$3 per year dues and the BULLETIN continues to come to you as before, your \$1.50 subscription being included in the dues. Only this time, you'll be sponsoring the wonderful work of A.W.A., get regular reports of its activities, have access to its really vast library and collection of historical materials, and make possible a series of "monographs" on the many important phases of old time wireless which are documented in A.W.A. files and in its comprehensive collection of antique apparatus in the Holcomb (N.Y.) museum.

In our next BULLETIN, we'll present a complete picture of the A.W.A. archives - with as many pictures as we can. Meantime, meet the guys who have been bringing wireless history to life for us all - the officers and board of A.W.A.:

President W2GB, ex-8TC, Geo. Batterson
V.P./Treas. W2QY, ex-10Q, Linc Cundall
Sec./Curator W2ICE, ex-8ACT, Bruce Kelley
Board Members W2LK, ex-8KS, Clarence Dengler;
W2LF, ex-8KT, Gene Handler; W2CTA, ex-8WW,
Chas. Brelsford; W2YBK, ex-9LT, Larry Triggs

VALUATION LISTING

The "Valuation Listing" represents the average values for historical material established from a questionnaire sent out in the January Bulletin. We believe it is the first official listing ever made and should be a useful guide to the radio historian. Another one may be tabulated in the future covering other material. Any suggestions?

Needless to say, compiling the information was a tremendous task particularly since there were just under 3000 values to compute. Approximately 4% of the total figures recorded were deleted because they appeared completely out of line indicating that the subscriber was either unfamiliar with the material or was not informed of the present day market value. Examples of this were 50¢ for a 1916 QST when some collectors are currently paying around \$50.00 for one good copy in order to complete a collection. The Alexanderson Alternator was of course a "sticker". Gleason Archer's book titled "History of Radio" states that on page 385 that G.E. sold the Alternators to RCA for \$127,000 a piece! Even at scrap value, these huge giants are certainly worth more than \$1 that some had indicated! Therefore, all values that appeared far from the average were not used in order to come up with a reasonable reference figure.

Since the values were from collectors all over the country, we had an opportunity to note the trend. It definitely indicated the W-6-7 and evaluated the material slightly higher than the fellows on the East coast which is understandable. It was also noted that the greatest spread or difference was in magazines and books and the closest agreement was with tubes. Wisely, many did not attempt to give a figure for the rare commercial gear which is extremely difficult to locate. It was also interesting to note that many recognized the value of the old "E, I 10¢ Crystal Detector" - a small cheap item that started many an old timer on the road to "hamdom" 50 years ago. Others misjudged the value of the rare Marconi gear such as the Marconi 10" spark coil at \$2. This huge coil is practically a transmitter in itself and was used in Marconi installations as early as 1901. As a final word, although we personally do not agree with all the values shown, we do feel the listing represents a reasonable picture of the present day market.

Bruce Kelley, W2ICE
Curator, A.W.A., 6/1/61

"EDISON" is the title of a biography written by Matthew Josephson and published by McGraw-Hill (1959). The book is exceptionally well written with fine photographs. Currently on sale at most bookstores - it is a valuable addition to your historical library.

Amateur Radio in the NYC Area pre-WWI

by Dan McCoy W8DG

My entry into Amateur Radio began about 1901 or 1902. My father brought home a book on electricity which my curiosity caused me to explore. I came upon a chapter devoted to "wireless". This intrigued me and it was not long until I started trying to duplicate the equipment shown, namely, spark coils, coherers, etc. There were no schools near home in Yonkers at that time - so I went thru my first few grades at Tarrytown, N.Y. living with my grandfather, who was Superintendent of the Hudson Division of the New York Central R.R. He had a railroad telegraph line into his den at home and most every evening he would "listen in on the wire". He taught me the American Morse code; getting a key, batteries and a sounder so we could practice. Thus, when I did hear my first "wireless" signals I could read some of them and identify the stations adding to my thrill and enjoyment of the hobby. The usual chain of progress for most amateurs was reversed in that I knew the code and could read a little before I heard my first signals.

My first two-way contact was in 1906 with Irving Vermilya, call letters "VN" at that



OPERATING TABLE "2 H A" - JANUARY 1915

Receiving equipment on right. Antenna switch to left of receiver - replica of United Wireless switch. "Anchor gap" above - replica of United Wireless Gap. Tuner, modified Murdock loose coupler (slider on primary replaced with tap switch); DeForest "Audion" detector - "B" batteries in box beneath "Audion" Cabinet, filament batteries #6 dry cells to right, filament rheostat knob on left of "Audion" cabinet; secondary tuning condenser (Murdock) to right; Plate "regeneration" variometer (DeForest) to left of "Audion" cabinet. Key breaking primary of transmitting transformer on extreme right of table.

time, living in Mt. Vernon, perhaps 10 or so miles away "as the crow flies". Today, I still work Irving occasionally whose present call is W1ZE.

American Morse code was used by all U.S. Commercial, Government, and Amateur stations except

the Marconi Company's ships and shore stations. It was not until after the Titanic disaster, April 15, 1912, that serious consideration was given to adopting an International code for wireless work. The Continental Morse code was finally adopted and today is the recognized code for radio operations. Many squabbles ensued between proponents of the two codes before this came to pass. Our U.S. radio men were better off as many of them had to work land lines at shore stations, and knowing both codes added to their versatility. It is interesting to read some of the arguments in the old literature. My personal opinion is that the American Morse code is faster, and no more susceptible to errors due to static and QRM. I still use it on the air with many of my old boyhood buddies, and some old land line telegraphers who have adopted amateur radio as their hobby. Most American Morse men have a distinctive "fist" and send cleaner, better spaced and more easily read C.W., especially the old timer.

Wireless equipment in the early days was decidedly crude. For some years there was no "store boughten" equipment and you had to "roll your own". Finally, the Electro-Importing Co. in New York City came into existence, followed by Manhattan Electric Co. under the able direction of Lou Pacent, then the J. H. Bunnell and other sources of supply. Nevertheless, most amateurs in those days built their own primarily for financial reasons and also for the pure joy of accomplishment.

As to the financial side, I might comment that in those days I was delighted to get an occasional job mowing a lawn of goodly size with a handmower for a quarter. Today I pay a high school boy with a "ride around" power mower \$7.50 per cutting to manicure my lawn! He has a regular clientele which keeps him busy every

day during summer vacation. At least he is willing to work. So no wonder most of today's newcomers go down to the radio store and buy their equipment instead of building it.

Outside of signals picked up across the room from a small spark coil as transmitter, I was never able to get any results with a coherer. My first successful receiving equipment on which I heard outside signals used a single slide tuner, a "microphone" detector and a 75 ohm earphone, with a whale of a big antenna. With this I was able to hear ships in New York Harbor, several of the nearby shore stations and the Fall River Line steamers when they were on Long Island Sound. Maximum range perhaps not more than 50 miles.

Commercial stations heard in and around the New York City area in the early days were:

- D.F.* United Wireless Co.,
Manhattan Beach, N.Y.
- N.Y.* United Wireless Co.,
42 Broadway, New York City
- W.A.* United Wireless Co.
Waldorf-Astoria Hotel, N.Y.C.
- B.S. United Wireless Co.
Bellevue-Stratford Hotel, Philadelphia, Pa.
- A.X. United Wireless Co.
Atlantic City, New Jersey
- H.A. United Wireless Co.
Cape Hatteras, North Carolina
- B.G. United Wireless Co.
Bridgeport, Conn.
- O.H.X.* New York Herald
Battery Park, New York City
- C.C.* Marconi Wireless Co.
South Wellsfleet, Mass. (Overseas Press)
- M.S.E.* Marconi Wireless Co.
Sea Gate, N.Y.
- M.S.K. Marconi Wireless Co.
Sageponak, N.Y.
- B.D.* Massie Wireless Co.
Jerome Ave., Bronx, N.Y.
- W.N. Massie Wireless Co.
Wilson's Point, Conn.
- N.A.H.* U.S. Navy
Brooklyn Navy Yard, N.Y.
- N.A.G.* U.S. Navy
Fire Island, N.Y.

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Most of these consisted of a piece of silicon, galena, or pyrites upon the surface of which a very fine "catwhisker" of wire made contact. Pressure of the contact, and location of a sensitive spot on the crystal surface were essentials in adjustment. These detectors were also sensitive to shock and jarring and to energy from the transmitter. More often than not they had to be re-adjusted after each transmission. These were followed by the "Perikon" consisting of a crystal of iron pyrite in contact with a piece of red zinc oxide, and the silver-antimony with a small bit of antimony metal in contact with a piece of silicon. These crystals were set in cups of "Wood's metal". Here again hunting around for the sensitive spot was the first requirement of good adjustment, but both required a mild pressure between the two elements and were not as subject to shock or jarring as the catwhisker types. The "Perikon" was the more sensitive of the two; however, it was no better from the standpoint of being knocked out by the transmitter, whereas the silicon-antimony stood this very well and was in my opinion the most satisfactory overall detector of its time. The carborundum detector, which became extensively used by the old United Wireless Co. and its successor, The American Marconi Co., consisted of a piece of carborundum, sometimes set in a cup of "Wood's metal", with a blunt point against the carborundum with substantial pressure applied. This was not as sensitive as the "Perikon", silicon-antimony or some of the catwhisker types, but would stand an awful lot of shock and jarring, would stand energy from the transmitter and stay in adjustment. In fact, some of the commercial stations used break-in with carborundum detectors, by placing an "anchor gap" in the ground lead from the transmitter as near to ground as possible and connecting the receiver

across the gap. I used this at old "2HA" for some time. The carborundum detector, for maximum sensitivity, also required a small voltage across it like the electrolytic.

Finally came the "audion", the predecessor of our present day vacuum tubes. These were out of reach, financially, through usual sources of supply for the "run of mill" amateur when first brought out. However, it soon became known that rejects could be obtained from the manufacturer (through the backdoor) for a five spot, and many amateurs soon adopted the Audion and discarded the crystal detectors. I sometimes wonder if the manufacturer did not do a more sizeable volume through the backdoor by sales to amateurs than he did through regular outlets !

The Audion was extremely sensitive compared to its predecessors, and would bring in signals far better than any device so far available to the amateur. They also could be "souped up" by properly placing a permanent magnet from an old discarded telephone ringer magneto in proper relation with the bulb of the audion.

Loud speakers were unknown in those days, headphones being the means of hearing the signals. It was quite a shock to put on the phones for the first time using an Audion detector after being accustomed to the signals received over the older types of detectors. "I am reading you with the phones on the table" was equivalent to today's "5/9/9 plus" report !

Unlike today's tubes, the old audions were erratic as to plate voltage as required for each individual tube. Some would operate on 15 or 20 volts, while others would require 100 to 200 volts to operate. So when one acquired a "back door" tube more likely than not experimentation with plate voltage would be necessary. Lucky was the amateur who came by a 15 to 20 volt tube and did not have to have a sizeable

investment in "B" batteries.

As to tuning equipment, the one slide tuner was in time replaced with the two (2) slide tuner. Many thought two slide tuners made it better. The old United Wireless Co. three (3) slide tuner was copied to some extent by hams. It required a special antenna with two lead-ins, these making a loop through the other end of the antenna. Finally about 1910 or so the loose-coupler came into use and since has been the standard, although as used today, the coupling is fixed.

Following the loose-coupler, tuning condensers came into use for more accurate tuning. My first tuning condenser consisted of a dead #6 dry cell with foil wrapped around the cardboard container on the outside forming one electrode (today's stator) and the zinc of the cell forming the other electrode (today's rotor). Of course the cell and container had to be in sufficient state of preservation so that the cell itself could slide in and out of the cardboard container. By efficiency standards of these days it mattered little if the cardboard was rather wet from chemicals absorbed from the deteriorated cell, just so it would slide. "Low-loss" had not yet been invented, and we did receive signals with this crude device, in fact, the first one I saw was in a commercial shore station.

For transmitting, the amateur of the early days usually started out with a small spark coil and slowly graduated to a larger one. A 1/4 inch spark coil, the 1/4 inch being the distance the spark would jump between two electrodes of a "spark gap", was common for the beginner. Later a coil from the ignition system of the old Model "T" Ford automobile became standard practice for the beginner. This coil was able to give about 1/4 to 3/8 inch spark. A 2" spark coil

was high power, and the occasional amateur who could come by a 6 or 8 inch spark coil had super-power. Here I might add that the early transmitters on the British Marconi marine installations used 10 inch coils, and the first transmitters I used in 1911 on the Fall River Line steamers used about the same. (Ed. Note - the Antique Wireless Assn. has such a coil in its museum and will take inputs over 500 watts !)

At first, the coil was hooked up with one side of the spark gap connected to the antenna and the other to the ground. No "tuning coils" were used. Your frequency, or wavelength as it was termed in those days, depended mainly on the size of your antenna and the length of your ground wire. Later, tuning devices were added. However, little thought was given to measurement of wavelength. For some time you would rarely find ships or shore stations on the same tuning adjustment of your receiving equipment, and the same for amateurs. You had to "fish around" till you found them, then mark your tuner so you could find them the next time you wanted to hear that particular station.

For example: in the summer of 1912 I was assigned to the S.S. North Land of the Eastern S.S. Lines on the N.Y. to Portland, Maine run. Leaving New York we were required to report in when leaving the dock. I never had any trouble raising the New York City station "N.Y." leaving dock, but as soon as I got beyond the Brooklyn Bridge and out into Long Island Sound, I could not raise any station in or around New York to save my soul. I had no trouble raising stations around Boston or Cape Cod when near there; also ships not too far away, I felt I was not getting out of my equipment what I should. It certainly did not compare with the performance I had from equipment on the S.S. North Star the previous summer, on the same run. So after worrying with

this for a week or ten days, I complained. The Port Inspector (none other than Dave Sarnoff) came down to check the transmitter. To make a long story short, my transmitter was tuned to about 250 meters instead of 600. The antenna on the North Land was short and slightly off center fed. After tuning the primary circuit I was in business. How many other ships and shore stations were in this same fix I do not know. Judging from the way you had to hunt for them on the tuner, I am inclined to think it was more common than not. Next summer when I took the S.S. Old Colony on the same run, things were decidedly better. Probably "D.S.", with his usual thoroughness, had taken a lesson from the S.S. North Land, and cleaned up a lot of the stations while I was back in school during the fall, winter and spring.

The "note" emitted by most spark coils was a low growl, particularly the old Marconi equipment. Amateur equipment gave off a variety of notes, depending on how fast the vibrator on the spark coil made and broke the primary circuit. Power for amateur transmitters came mostly from #6 dry cells or storage batteries, the latter being the de-luxe equipment of those days.

Gas lighting in houses was still widely used; few were wired for electricity. In fact, our home, while wired when built, was not lit by electricity for some years after I had a.c. in the shack in the back yard to operate my transmitting equipment.

Finally, alternating current transformers came into use replacing spark coils. Along with them came attempts to tune signals to some wave-length. The use of A.C. required high voltage condensers on the secondary side of the transformers. These were a pain in the neck for all of us for some time. Most early high

voltage transmitting condensers were made from old 8 x 10 glass photographic plates with tin foil sandwiched in between the plates and the whole assembly of 10 or so plates dipped in some "gunk" to seal out the moisture. These plates would puncture and the whole condenser would have to be taken apart to locate the puncture plate and replace it. Mom's kitchen stove would have to be called into service to melt out the "gunk" - too often with overheating and the "gunk" filling the house with smoke as it dripped out into the oven and fried !

My first high power A.C. transmitter was bought from Randy Runyon, now W2AG, when he replaced it with a United Wireless "Coffin" and associated equipment. It had a Clapp-Eastham 1 K.W. "Resonant" transformer, and a high voltage condenser of back breaking weight, dimensions about 30"x 14"x 14", filled with sections of condenser made from 8 x 10 photographic plates, perhaps, 15 or 20 sections. These were connected to two brass bars on the outside. As one section burned out you would disconnect it and wire in a good one. The number of sections more or less determined the pitch of your note. As I recall, about one-third of the sections in the box was about right for a good sounding note for me. So you just kept changing sections until they were all burnt out; then you had to dismantle the whole mess (and I mean mess !) and repair it. I know my mother would like to skin me alive more than once until I replaced the condenser "coffin" with some leyden jars. And thereby hangs a tail.

By this time, most commercial stations used leyden jars. These were made of glass suitable for the electrical stress the high voltage would put on them. The 8 x 10 photo plates were never meant for electrical stresses encountered in

high voltage condenser service. Instead of tin foil, the electrodes were copper plating deposited on the inside and outside of the glass. It was very rare for these to break down, particularly in amateur service. The amateur who could ^{come} into possession of enough of these to handle his high voltage transmitting condenser needs really "had it made." I finally acquired six, and have a sneaking suspicion that the break down and replacement of these in commercial service was very high judging by the rapidity with which some amateur use of leyden jars increased. Molded high voltage condensers were also introduced by Murdock and solved many amateur's problems.

Most of the commercial operators in those days were recruited from amateur ranks. I served on my first ship the S.S. Providence of the Fall River Line, followed by the S.S. North Star of the Eastern S.S. Lines in the summer of 1911 when I was only 16 years old. A curve shown in a paper by V. Ford Greaves in the September, 1914 "Proceedings of the Institute of Radio Engineers" shows that the majority of the 1st Class operators were 19 years old as of February 14, 1914, which happened to be my age of that date. Many of my amateur contemporaries were in the group. Many, like myself, worked only in summer vacations or during holidays. Some either left school for a career of radio operating, or bowed out for awhile to go to sea and then went back to finish their education.

Commenting on these statistics, Greaves says: "It is interesting to note that most of the operators are 19 years of age. This is true of both the first and second grades. It is assumed that if the number 21 years of age and above were shown, the curve would drop down from 19 as indicated at 20."

The maximum at 19 may be accounted for if we assume that "wild oats" are usually ripe at about that age. I think that most young men who are suddenly imbued with a desire to leave home for a career at sea as radio operators are about 19 years of age. (Such was my own personal experience, and while I do not advocate or approve of young men leaving school at this age, unless necessary, I believe the radio operating field offers such young men better opportunities than many other lines of work that they might follow.) There may be other interesting psychological reasons accounting for this age maximum."

I do not agree with Greaves on the "wild oats" aspect. For a few, of course, this was true, but the majority of those recruited from the amateur ranks were deeply interested in radio, wanted to see some of the world, enjoyed being of some use and making a bit of pocket money, if they did not elect to take radio up as a career. The average amateur on a ship with good equipment available could run rings around the school-trained operator or a converted land line man of those days because of the practical experience he had reading thru QRM, QRN and other training gained in his amateur experience.

I never had any trouble getting an assignment when I was available. In fact, just before the 1912 Christmas vacation, they called me at High School to take a trip to Panama on the S.S. Aliancia, Panama R.R. Line, and asked me to bring my own second operator along as they were desperate for men. This I did with one of my high school friends who had a 1st Commercial ticket. We had a most enjoyable trip to Panama in spite of some of the nastiest weather I have ever seen at sea. We went thru the Canal by rail and on foot before water was in it, swam in both the Pacific and Atlantic oceans on New Year's Day,

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coupler pulling in the received signal. A picture of my 1915 station is in Figure 1.(Pg.1)

Many boyhood friendships were formed through amateur radio prior to W.W.I which have continued to this day. I still work Irving Vermilya, my first two-way contact. As I sit here and type this, I hear W2EXM, Fred Parsons, warming up for our daily 2 P.M. schedule on 7004 K.C. Fred, along with Art Boeder, W1CQR, Clarence Pfeifer, W2FG, Randy Runyon, W2AG and Clarence McKee, K2ET, were all worked almost daily in the old days, and we still get together quite regularly on 7004 K.C. and tear off a bit of fast American Morse, much to the amazement of some of the newcomers who think it is some kind of Chinese or Japanese code. Many others, who were members of the Radio Club of America in its early days when I first joined, I still number among my friends. When in their vicinity, we get together for a QSO over lunch, etc.; or often a pleasant surprise occurs when one shows up on the air. Most served in some capacity for the Armed Services in W.W.I I can't finish without adding some true experiences of hams of those days. Doubtless some hams of today go thru somewhat risky experiences also. Why many of us old timers are alive today can only be explained by the "Providence that guides drunkards and fools" to which I'll have to add "radio amateurs." No names will be cited in the incidents following. Maybe you will recognize the parties involved, maybe you won't. I'll start by telling one on myself.

There were no high trees convenient for "sky-hooks" for antennas at my old home in Yonkers. So masts I had to resort to. I was fortunate in having a neighbor who had charge of the Postal Telegraph Company's lines in Westchester County. His good offices were often used along with those of his son to help erect masts at my old home. One day, erecting a 50 foot spliced mast

scrounged from the nearby woods, I was up on the mast securing a middle guy wire when the anchor for the top and middle guys to the northwest lot



ANTENNA AT "2 H A" - JANUARY 1915

50 foot spliced mast. The one with steps on is the one I rode down. It was reerected without top mast. Antenna approximately 100 feet long, three wires of 7 strand # 21 Phosphor Bronze, insulated with small Electrore insulators on each wire at spreaders. Spreaders about 10 feet wide, 3 wire lead-in from top of mast to shack at foot of mast. Operated against ground consisting of numerous wires buried just below surface of lawn below the antenna. Antenna supported at near end from electric light pole across the street.

go and the mast started to fall to the east. I was about to jump the 25 feet when my Postal friend told me to "ride it down" until a few feet from the ground and then jump where I would be clear of the mast. This I did and came off without a scratch. Several times since I have had to use this technique to save myself from what would surely have been broken bones and perhaps a mast falling on me. The mast base was not set deep because of rock, and the offending guy wire had used a post of a fence around the chicken yard as an anchor instead of a stout small cherry tree which could better have been

used. The post was rotten just below ground and when the strain was put on it, it let go. So I learned three lessons: set poles as deep as possible, never anchor a guy wire to a fence post, and ride a mast down before jumping !

Another contemporary ham, after the New Haven R.R. was electrified (11,000 volts on the trolley line), got curious to see what would happen if a wire was thrown across the line. The wire did not reach the ground so nothing happened until a large freight drag came along and the wire caught on the smoke stack of the steam locomotive. There was a blinding flash ! The engineer brought the train to a halt and got out to figure out what had happened and found his locomotive without a smoke stack. Of course, the wire had burned it off with the stack, so he never knew "how come" his smoke stack had been "evaporated."

Two other ambitious hams were searching for daylight DX and hit in the idea of flying an antenna on a large kite. All went well until the wind shifted and blew the wire across the 7500 volt 3 phase feeder lines which supplied that whole end of town. Much fireworks resulted,

with the lines coming down into the main lines of one of the telegraph companies and cutting off electric service in that end of town and putting the telegraph company out of business for some time. Fortunately, the kite was controlled by a heavy cord with the antenna wire fastened to the kite, but sagging below the cord and being paid out from a spool of wire. The flyer of the kite had the cord in his hand instead of the wire - so no "silent key" here.

Another used to scrounge his juice to operate his transmitter and for other experimental use from the feeder lines for the trolley system passing by his house. A nail with a number 12 or 14 wire was driven into the feeder cable and the wire ran thru trees nearby and into the basement of his house. As I recall it, the 600 volts D.C. was dropped to usable voltage by electrodes in a keg of salt water solution. Why no "silent keys" here ? I dunno, except for that Providence previously cited.

Much more could doubtless be added to this narrative - but it is too long already - so 73 and 30.

"Dan" McCoy - W2DG



K E Y S and more K E Y S

You guessed it - this is Lou Moreau showing W3JDV part of her fabulous key collection. Jack paid "Lou" a visit and ended up "gabbing" about old gear, keys and landline equipment until the wee hours of the morning!

"PRODIGAL GENIUS -LIFE OF NIKOLA TESLA" a book written by John O'Neill (1944) is a rare book for your historical library - if you can find a copy. Originally selling for \$3.75 - it is currently selling from \$6 to \$10 at used book stores. A very controversial personality, Tesla lived to the ripe old age of 84 when he passed away on Jan. 7, 1943. After reading the book we came to the conclusion he was also a hypnotist amongst other things.

MULTIPLE TUNER pictured in last Bulletin fascinated K2ZSA, former Marconi operator. Seems Leo feels the same as others - such equipment is rare indeed. However, he feels that the fellows had better start concentrating on WWII gear before it becomes hard to find. His newest acquisition is a TBW5, a Navy 300 watt xmtr.

HUGE SPARK COIL is the newest item for W6GH. Vance thinks it might be of Marconi origin - there is no name plate or identification. It is quite different than his United "coffin" (formerly used on a Great Lakes boat) which of course is in a box. Foto coming up.

AMATEUR POSTAGE STAMP - word comes thru from K2EE and W3YA that the Government will issue sometime in the future a postage stamp commemorating amateur radio. Be sure and buy several blocks of these stamps. Dope later.

RAGCHEWING NET FOR AMATEUR HISTORIANS -- Everyone is welcome to join the amateur radio historians every Monday night starting in September. CW - 7:30 p.m. EDT on 3515 kc. on 1st and 3d Monday each month. PHONE - 7:30 p.m. EDT on 3945 kc. on 2d and 4th Monday each month.

CONTINENTAL vs MORSE

by "Lou" Moreau, W3WRE

When the Europeans rejected the American Morse code for the Continental, they also rejected the speed and flexibility that has been the trade mark of the American telegrapher. This was made particularly obvious in World War I when the Allied Powers were planning the "London-Paris" telegraph.

The plan called for a circuit involving a great number of wires and hundreds of operators to handle the tremendous traffic load that would be sent over the wires. When the plans were in the final stages, Maj. Gen. Squier, (U.S.A.) was asked for suggestions or improvements. He told them the whole thing was excellent but quite unnecessary since he could do the entire thing with the present telegraph cable between the two countries and only twenty-four operators.

Both the British and French were openly contentuous, explaining that he didn't understand the huge amount of traffic that would be involved and that twenty-four operators would be incapable of the job no matter how expert. They went on to say that even if it were possible, the only way it could be done would be by "fudging" in their own "fills" and probably time would be lost due to error in copy as well.

Squier, in turn, explained that he was well aware of the necessity for accuracy as well as the fact that speed in processing the messages was vital; however, he would guarantee accuracy and invited them to insert test messages and any error was to be reported to him personally.

Since it was important that the system be put into operation as soon as possible, they agreed to try Squier's suggestion while the new line was being built.

General Squier imported 24 American "BONUS OPERATOR'S" and put them to work. 12 were stationed in England and 12 in France. It was just another wire for these veterans, and, using the fast American Morse cut 1/3 more with the Phillips abbreviations and the speedy, balanced American keys, they set to work burning the wires and proving that Squier was telling the truth!

If any test message went through wrong, there was no complaint and the original plan was shelved as these "Speed Kings" kept the hooks clear!

RADIO CLUB OF AMERICA President Renville McMann notified us that the request from old timers for copies of their Anniversary Book and Recording was quite surprising. Additional copies are available - see former copies of "Bulletin".

DEARBORN MUSEUM Curator Frank Davis found himself the speaker and projectionist on several occasions for the A.W.A.'S show "PIONEERS OF WIRELESS". Tate, W8FX, thinks the West Coast "gang" should make a similar show covering early wireless installations in the west.

OLD TIME HAM-ADS

GREBE receivers in mint condition available for swapping. Want other Grebe receivers, components or literature. Jack Gray, W3JDV, 500 Church St., Mason, Ohio

QST'S wanted - need first 12 issues plus Jan. and Mar. 1917. Will swap several 1917, 1919 and 1920 and up for one copy I need. Write: Roland Zehr, W6BFZ, 4126 Midvale Ave., Oakland (2), Calif.

FOR SALE - collection of 88 different types of old tubes plus an Aeriola Sr. Write for details. Mark Leitch, 34 Park Drive, South, West Orange, New Jersey

RADIO NEWS WANTED - Jan., Feb., 1920, Feb., Sept., Nov., 1921, Mar., July, 1925. Also looking for Radiola VII-B and Aeriola Grand. Paul Thompson, 1300 S. Main St., Las Vegas, Nevada.

UV-202, RCA "5 watter" wanted in good condition with intact filament. Pay any reasonable price. Earle Young, 450 Magee St., Rochester 13, New York

FOR SALE - RCA Ham Tips starting with Vol. 1, No. 1 (1938), G.E. Ham News, Vol. 1, No. 1, Handbooks, Radio News, QST, Radio, etc., all very reasonable. Write Walt Babcock, W2RXW, 405 Sayles St. Oneida, NY

Each reader is entitled to one Old Time Ham Ad in any one issue without cost. All articles must be over 25 years old.

SWAP/WANTED - QSTs badly needed for personal collection. Need the first 12 issues plus Jan. and Mar. 1917. Have excellent 1917, 1919 and 1920 to 1953 issues for trade. Will swap several for those I need. Roland Zehr, W6BFZ, 4126 Midvale Avenue, Oakland 2, California

SELL OR SWAP - Marconi S-625 double ended triode, Marconi "R" valve, Marconi PX-4, rare Philips D-1 and B-2 tubes plus early British Navy, Osram and Mullard types. Also a Westinghouse RA, DA and Grebe RORQ, books, etc, James Stegner, RD #1, Mt. Zion, Clearfield, Pennsylvania

TRADE - one copy of Dept. of Commerce "Rules and Regulations of the U.S. and the International Radiotelegraph Convention, 1914" for one nice crystal set or a 1 or 2 tube receiver. Make offer. WA6ORA, 7734 Sterling Ave., San Bernardino, California

WANTED - Early edition of the Phillip's Code. Anything between 1910 and 1925. Lou Moreau, W3WRE, 639 Russell Avenue, Johnstown, Pennsylvania

WANTED: Vol. IV of "Everyman's Guide to Radio" by Popular Radio Inc. (1926) Will trade a copy of Vol. 1 or pay cash. Fred Penard, 65 Maple St., Norwood, Mass.

WEST COAST - historian with lotsa dope on Popoff (including owning a book on Popoff's work which is written in Russian which he can't read!) is our friend WA6ORA. Jack, a one time holder of many commercial and amateur calls, has worked up thru the years an acquaintance via "ham" radio with Ernst Krenkel, RAEM. Between Jack and W2IA we should have some fb info on a rare subject.

GENERAL ELECTRIC OLD TIMER'S NITE - guests had an opportunity to see many of their early products on display from the Antique Wireless Association's Museum. Items included oscillation transformers, magnetic modulators, audio and power transformers and other gear especially designed for the amateur 40 years ago. In the broadcast field were the many early Radiola receivers manufactured by G.E. for RCA starting with the earliest battery sets using WD11's thru to early TRF A.C. receivers.

Historical equipment from the A.W.A.'s barn museum is frequently on loan to all kinds of organizations such as the I.R.E., Public Museums, etc., plus Amateur Hamfest and A.R.R.L. Conventions.



SIDELIGHT-D.V.R.A. OT NIGHT.

W2QY is adjusting a coherer with W3AX offering suggestions. W2ICE (standing) is hoping against hope they get the blasted thing to work --- and they did! (Photo tnx to X-3DW)

VALUATION LIST

Condition: AVERAGE GOOD
Valuation: Minimum Maximum Minimum Maximum

1. Paragon RA-10 Receiver	\$5.50	15.00	10.00	23.50
2. IP-76 Receiver	\$12.60	37.00	20.00	65.00
3. Grebe CR-3 Receiver	\$4.40	10.10	9.60	24.00
4. Westinghouse Type "R" series receiver	\$6.50	15.00	13.00	22.00
5. National SW-3 with two set of coils (receiver)	\$4.50	13.00	6.20	17.20
6. IP-501 (SE-1420) receiver	\$12.60	23.00	17.50	45.00
7. IP-500 (SE-143) receiver	\$11.00	23.00	19.00	43.00
8. IP-501A receiver	\$12.00	23.50	22.00	47.00
9. Marconi Type 101 receiver	\$13.00	32.00	27.00	56.00
10. Marconi Type 106 receiver	\$11.50	29.00	23.00	45.00
11. Marconi Type 107-A receiver	\$14.00	35.00	26.00	52.00
12. Marconi Multiple Tuner	\$28.00	78.00	47.00	120.00
13. Type "D" tuner.	\$14.60	36.00	25.00	60.00
14. Marconi 10 inch Spark Coil (transmitter)	\$13.30	41.00	25.00	60.00
15. Freshman Masterpiece (5 tube battery receiver)	\$2.80	8.60	5.50	11.50
16. Grebe Synchrophase (battery receiver - broadcast)	\$3.70	9.20	7.80	18.00
17. Fada Model "160" (battery broadcast receiver)	\$3.60	8.30	6.50	13.00
18. Atwater Kent Mod. 10 (breadboard battery receiver)	\$6.50	14.20	10.60	21.50
19. Magnavox Horn Speaker (early external field type)	\$2.90	5.80	6.00	10.50
20. Boston Key	\$3.70	7.00	5.40	9.50
21. Bunnell "Sideswiper"	\$3.00	5.80	4.50	8.00
22. Homemade 2 tube receiver of the 1920's	\$1.50	4.00	2.90	6.70
23. Chamber's Rotary Gap (without motor)	\$7.60	14.00	11.60	22.00
24. Benwood Rotary Gap (without motor)	\$5.00	11.20	9.70	17.20
25. Fix gap on marble or slate base.	\$2.10	6.00	4.10	7.10
26. Thord. 1000 watt Spark Transformer.	\$4.60	9.00	8.00	15.00
27. Blitzon (Clapp-Eastham) 250 watt spark transformer.	\$4.30	9.00	7.60	17.00
28. Murdock "mud" spark condenser (.0017 mfd.)	\$1.10	2.50	2.00	3.60
29. Murdock loose coupler	\$3.30	7.20	5.50	13.00
30. Omnigraph - 5 disc type.	\$3.40	7.00	5.40	12.00
31. 1000 turn Honeycomb coil in mount.	\$.85	1.60	1.30	2.50
32. Audiotron tube (cylindrical - no base)	\$1.20	3.00	2.00	5.60
33. Electron Relay tube (cylindrical - no base)	\$1.20	2.90	2.20	4.70
34. DeForest "H" tube (transmitting)	\$1.00	2.70	2.00	5.60
35. VT-1 receiving tube	\$.90	2.10	1.60	2.70
36. VT-2 transmitting tube	\$1.00	2.20	1.70	3.40
37. DeForest Audion (spherical -receiving tube)	\$5.60	12.40	9.60	21.30
38. Schickering Type S-300 receiving tube	\$.56	1.40	1.10	2.60
39. RCA UX-210-A receiving tube	\$.35	.90	.53	1.40
40. RCA/GE UV-201 receiving tube	\$.66	1.30	1.00	1.50
41. Welsh "Dollar" Detector tube	\$1.00	5.00	1.25	5.20
42. Meyers Audion	\$.70	2.15	1.50	3.00
43. UV-202 "5 watter"	\$.88	2.25	1.60	3.80
44. "p" Tube (Early G.E. UV-204)	\$2.00	4.60	3.30	8.50
45. Electro-Importing 10# crystal detector	\$.40	1.10	.90	2.10
46. 1916 QST	\$7.80	15.00	11.00	24.00
47. 1920 QST	\$1.20	3.00	2.00	4.75
48. 1925 QST	\$.60	1.50	1.10	2.75
49. 1930 QST	\$.28	.68	.65	1.20
50. 1916 Wireless Age (Magazine)	\$.56	1.50	1.30	3.00
51. 1921 Radio News	\$.50	1.25	.90	2.00
52. 1928 Radio News	\$.27	.70	.60	1.25
53. 1913 Government Call Book (1st Govern. Call Book)	\$1.80	5.00	3.90	8.80
54. 1921 Government Call Book	\$1.15	3.00	2.30	5.40
55. 1930 Government Call Book	\$.90	2.40	1.60	3.50
56. 1st Edition of A.R.R.L. Handbook	\$2.00	4.40	1.20	8.50
57. William B. Duck Catalog - 1917 issue	\$1.10	3.00	2.10	5.00
58. Electro-Importing Co. Catalog - 1915 issue	\$1.70	4.30	3.50	8.50
59. "200 Hundred Meters and Down" (1936 original)	\$1.70	3.40	2.90	5.80
60. Robinson's Manual (Navy)- 1913	\$1.80	5.00	3.40	7.80
61. "Radio Telephony" by Ballantine	\$1.00	2.30	1.70	3.90
62. Marconi Yearbook - 1914	\$5.80	8.00	7.40	13.80
63. "History of Radio to 1927" by Gleason Archer	\$2.70	5.30	4.00	9.40
64. "Practical Wireless" - Bucher	\$1.00	2.00	2.00	3.50

COLUMN "A" MINIMUM VALUE

-- don't sell for any less.
-- a good "buy" at this price.

COLUMN "B" MAXIMUM VALUE

-- top selling price.
-- top purchasing price.

THE OLD TIMER'S BULLETIN

Holcomb, N.Y.
Bruce Kelley, Editor

FEATURE ARTICLES IN NEXT ISSUE

"They Always Come Back" by Dave Middleton, W5CA. Dave needs no introduction to the amateur fraternity. An old timer and holder of many calls, he has played an active part in amateur activities for over 40 years, including serving as ARRL Director. His story will bring back more than one poignant memory to the old timer.

"Early Detectors" by Geo. Applegate, W2IA. Again George, our historian, comes up with a fine technical article concerning early electrolytic and magnetic detectors. This is another in the series that he is writing especially for the BULLETIN.

FUTURE ISSUES

"The History of the National Electrical Supply Co." (NESCO) by Ed Duvall, X-3DW.

"The Grebe Story" by Jack Gray, W8JDV.

"Pioneering in Radio Astronomy" by Grote Reber, X-9GFZ.

"RTTY on WNL, 60 Kc" by Ken Gardner, W2BGN.

"I Tink She Aboard" by S. N. Blake, X-1CPW.

"An Adventure in Book Collecting" by Geo. Applegate, W2IA.

"Restoring Old Gear" by Linc Cundall, W2QY.

"The Seattle Historical Museum" by Howard Pyle, W7DE.

"How WGF Scooped the Competition" by Dick Kaufman, K2DMR.

WHAT IT TOOK IN 1907

In 1907, a popular journal for the experimenter was *Electrician & Mechanic Magazine*. It was one of the first to run regular articles on construction of wireless equipment. It was also valued for general information on the progress of the new art. In one issue it published a table showing the relative performances of different types of transmitting and receiving gear for that day, as follows:

Spark Coil	Antenna Height	Cocherer	Liquid Detector
$\frac{1}{8}$ inch	35 feet	1/8 Mi.	$\frac{1}{8}$ - $\frac{1}{2}$ Mi.
1	40-45	$\frac{1}{4}$	$\frac{3}{4}$
2	50	2 $\frac{1}{2}$ -3 $\frac{1}{2}$	5-10
4	75	10	10-20
6	100	15	15-30
10	150	50	50-75
15	180	60-75	75-100

Spark coils of 4" and above were specified as "tuned". An alternative to the 15-inch spark coil was an oil-immersed $\frac{1}{4}$ -kilowatt transformer and a battery of Leyden jars; with this combination, 100 miles was guaranteed!

(From "200 Meters and Down")